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PRODUCTION OF HOGS SUITABLE FOR WILTSHIRE SIDES

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United States Department of Agriculture, Bureau of Animal Industry, in Cooperation with the Montana Agricultural Experiment Station

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INTRODUCTION

Many of the more densely populated countries of Europe are unable to maintain sufficient numbers of livestock to supply their demands for meat and meat products. England especially, with its large industrial population, has always been a leading importer of pork and pork products, as that country produces only about one-half of the pork that its people consume. The favorite English cut of pork is known as a Wiltshire side, or Wiltshire bacon. A Wiltshire side is half of a dressed hog carcass, with the backbone, aitchbone, shoulder blade, and feet removed. The entire side is given a mild cure and smoked in one piece.

The production of first-class Wiltshire sides requires careful selection and processing, as definite standards must be met if the market is to accept the product. The hog should be long-bodied and smooth, with compact shoulders and a well-developed ham. The animal should be of medium width and depth, well finished, but not overly fat, with an even back fat about 1½ inches thick. A back fat of more than 2 inches is not desirable. The type of hog classified as intermediate, which is the meat type used in the United States, if slaughtered at a weight of about 200 to 220 pounds, will usually produce a

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[1] Retired December 31, 1936.

[2] The authors acknowledge the assistance of O. G. Hankins, in charge of meat investigations of the Animal Husbandry Division, in preparing a part of the manuscript and in grading some of the live hogs and carcasses.

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large percentage of carcasses of suitable conformation and finish for conversion into Wiltshire sides.

Although several countries export considerable numbers of Wiltshire sides to the English market, Denmark furnishes a larger percentage than all other countries combined. The Danish people have been so successful in developing their Wiltshire export business that approximately 80 percent of the hogs slaughtered in Denmark are exported to England as Wiltshire sides. This favorable trade position of the Danish pork producers is due largely to the fact that the Government has carefully planned and executed a system for the intensive supervision of methods of production and processing so that only the highest quality products are exported. The prices that the Danish farmers receive for their hogs are determined by the grade of Wiltshire sides produced.

The supervision by the Danish Government of the production of Wiltshire sides begins with the selection of the breeding stock. The Government maintains testing stations where the farmers send litters of pigs to be experimentally fed to marketable weight and then slaughtered and the carcasses graded under the most careful supervision. The litters that score highest in economy of gain and desirability of carcass bring an award of merit to their sires and dams, and similar matings are employed to produce breeding animals for commercial use. Careful study has developed the most satisfactory rations and methods of production, and these are closely followed by the Danish farmers because of the premium paid for first-quality carcasses. The rations fed contain large proportions of dairy byproducts and a variety of grains or other concentrates. The proportions of the various ingredients of the rations, and especially the quantities of dairy byproducts fed, are changed at stated intervals throughout the feeding periods. Pasture crops are not generally used, and the hogs are reared in well-constructed permanent buildings. Utilization of dairy byproducts is the major function of the swine industry in those densely populated countries which import a large proportion of the grain crops consumed.

Although some American meat packers have tried to stimulate the production of hogs especially suitable for conversion into Wiltshire sides, most packers merely select, from the general run of carcasses on the killing floor, those to be converted into Wiltshire sides. That American meat packers have not generally succeeded in marketing a product that competes favorably with European Wiltshire sides is clearly demonstrated by figure 1.[3] The preparation and marketing of Wiltshire sides by American packers have never developed into a large export business. Probably not more than 300,000 Wiltshire sides were ever exported from the United States in any year.

EXPERIMENTAL PROCEDURE

To obtain information on the procedure necessary to produce acceptable Wiltshire sides, the United States Department of Agriculture conducted experiments from 1927 to 1932, inclusive. During several of these years, information was also obtained on the suitability of hogs of Wiltshire type for producing pork for domestic consumption.

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[3] Based on data from the Division of Statistical and Historical Research, Bureau of Agricultural Economics, as presented in the statistical sections of the yearbooks of the United States Department of Agriculture.

Among the main points considered in the experimental work were the type of hog (lard or bacon), weight at slaughter, finish, thickness of back fat, length of carcass, and the kinds of feed used. The experiments were conducted at the United States Range Livestock Experiment Station, Miles City, Mont., in cooperation with the Montana Agricultural Experiment Station. The Minnesota and North Dakota[4] Agricultural Experiment Stations were studying production of Wiltshire sides at the same time, and there was close cooperation between these stations and the Department. The North Dakota station usually marketed the hogs in its Wiltshire experiment at the same time that the hogs from Miles City were marketed, and representatives from the North Dakota station and the Bureau of Animal Industry assisted each other in their marketing and grading work.

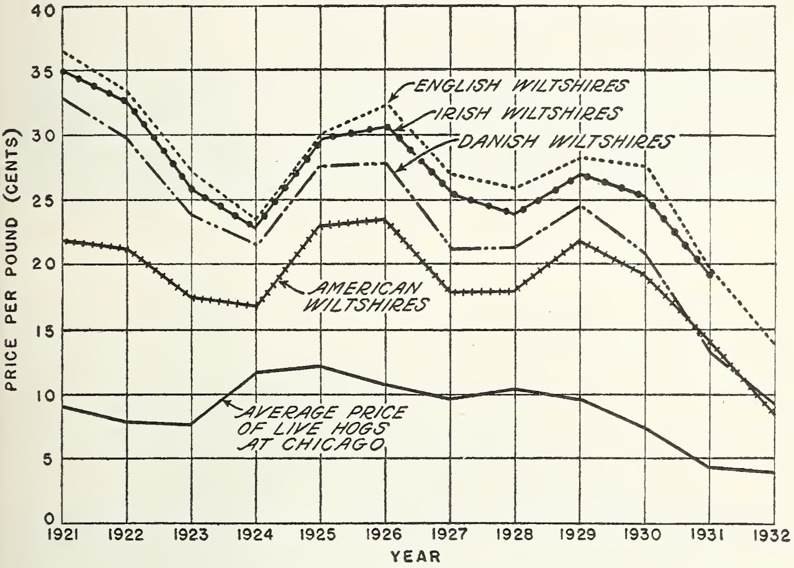

FIGURE 1.—Average prices of Wiltshire sides, from various sources, on the market at Bristol, England.

When the present study was begun, it was planned to convert into Wiltshire sides the carcasses of all the hogs meeting Wiltshire-side requirements as judged by representatives of the Department and the packing company slaughtering the hogs, to ship these carcasses to England, and to sell them on the open market, thus getting an appraisal of their value by the distributors or meat retailers of that country. However, during some years it was not possible to carry out the plans owing largely to differentials in prices of pork, which deterred American packers from making exports.

The general plan of the experiments followed as closely as possible methods used by the Danish producers of Wiltshire sides. The breeding practice of the Danish producers for the most part has been to mate their native Landrace sows with English Yorkshire boars, to use the crossbred pigs for slaughter, and to maintain the two pure breeds for the production of breeding animals. In the present experiments the breeds selected as being most similar to those used by the Danish producers were the Chester White, a lard breed, and the Yorkshire, a bacon breed (figs. 2 and 3). Much care was exercised in the selection of the breeding animals. Throughout the several years of the experiments, animals of the same type and conformation were selected to continue the breeding herds. The Chester Whites chosen were of good length, very smooth, and of general good quality. They would be classified as intermediate in type. The Yorkshires

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[4] Sheppherd, J. H., and Severson, Albert. WILTSHIRE SIDES: FACTORS WHICH INFLUENCE PRODUCTION AND QUALITY. N. Dak. Agr. Expt. Sta. Bull. 263, 43 pp., illus. 1933.

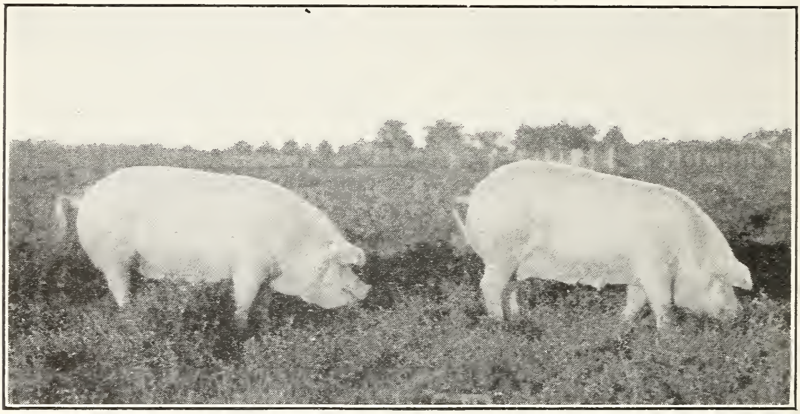

FIGURE 2.—Type of Chester White sows used to produce pigs for the Wiltshire experiments.

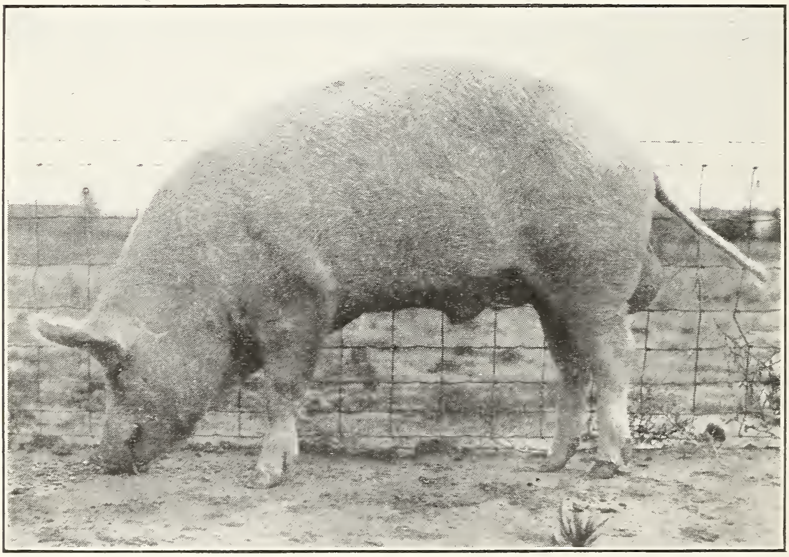

FIGURE 3.—Type of Yorkshire boar used to sire pigs for the Wiltshire experiments.

were long, smooth, deep bodied, of medium width, and with fairly well-developed hams. Matings were planned each year to produce a group of purebred Yorkshire pigs, a group of purebred Chester White pigs, and two groups of crossbred pigs, one from Chester White dams mated with Yorkshire boars, and the other from Yorkshire dams mated with Chester White boars. In addition to these two breeds and the reciprocal crosses, limited use was made of Duroc-Jersey hogs.

Feeding practices differed widely from those used by the Danish producers of Wiltshire sides. The Danish swine producer relies largely on the use of grains, such as barley, wheat, and sometimes corn (maize), with skim milk, a byproduct of the dairy industry, as the protein supplement. The feeds are mixed in definite proportions and hand-fed to pigs in small groups in the feed barn. The plan followed in this experiment was to self-feed the pigs from weaning to market on alfalfa pasture. The grain, tankage, and minerals were placed in separate compartments of the self-feeder, and the pigs were allowed free access to choose their own rations.

No expensive equipment was used; the overhead expenses, therefore, were very low. The climate of the area was such that from weaning to marketing the pigs were maintained on irrigated alfalfa pastures with only a sunshade for shelter and provision for a supply of fresh drinking water at all times.

In 1927 both mature sows and gilts were used to produce the pigs in each of the four experimental groups. In 1928 and 1929 the purebred pigs were produced from mature sows, and the crossbred pigs from gilts farrowing their first litters at approximately 1 year of age. This procedure was reversed from 1930 to 1932, inclusive. The mature sows and gilts in each breed were closely related.

Beginning in 1928, feed-consumption data were obtained on each group of dams from the beginning of the gestation period until the litters were weaned. During the gestation period each group had access to water and a mineral mixture, and was self-fed alfalfa hay in racks. In addition, the dams were fed one-fourth pound of digester tankage per head daily and sufficient grain, usually 5 or 6 pounds per head daily, to keep them in the desired physical condition. Throughout the gestation period an attempt was made to keep the breeding animals gaining in weight at from 1 to 1¼ pounds per head daily.

During the suckling periods the sows and litters were maintained in groups corresponding to the allotments of the breeding females during the gestation periods. After farrowing, a period of 10 days to 2 weeks was required to get the sows and litters on full feed, and from then until weaning they were self-fed grain, tankage, and minerals. Each group of sows and litters was placed on native grass pasture when the pigs were approximately 6 weeks of age.

The suckling pigs were weaned when about 70 days of age, immediately placed on plats of irrigated alfalfa pasture (figs. 4, 5, and 6) and self-fed grain, tankage, and minerals, until a marketable weight was reached. For the first 5 years of this study the grain fed to each of the four groups was ground barley. In 1932 ground wheat was used in the place of ground barley. Each group of pigs was continued intact in accordance with the previous grouping of their dams.

Each year the live hogs were individually graded after the close of the summer fattening experiments, and individual grades were obtained on the hog carcasses after slaughter. Dressing yields and meat-cutting data were also obtained.

In all these experiments the hogs were slaughtered and the carcasses processed in commercial packing plants located at the midwestern markets. Although these packing companies showed a fine spirit of cooperation, there were, nevertheless, many unsatisfactory conditions to contend with in obtaining more or less unusual slaughtering and processing data for relatively small groups of experimental animals.

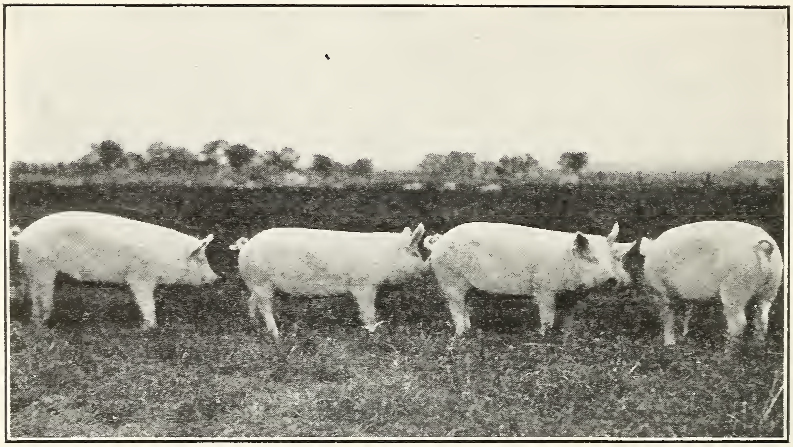

Figure 4.—Purebred Yorkshire pigs on alfalfa pasture at the United States Range Livestock Experiment Station. These pigs are representative of the type of Yorkshires produced in the Wiltshire experiments.

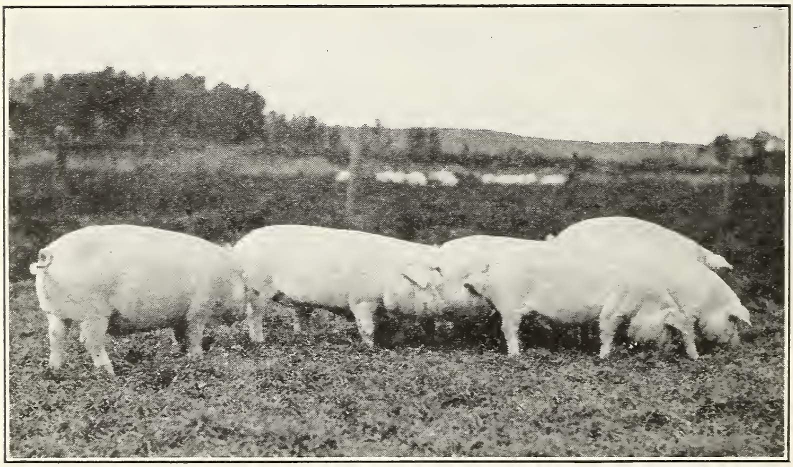

Figure 5.—Purebred Chester White pigs, of the type produced in the Wiltshire experiments, on alfalfa pasture at the United States Range Livestock Experiment Station.

In commercial packing plants, hogs are usually killed at the rate of 400 to 700 per hour. In the present experiments, as the hogs passed along the rail at this speed a rapid selection had to be made of the carcasses to be converted into Wiltshire sides, so that they could be split in a different manner and other operations adjusted accordingly. As an illustration of difficulties encountered, in 1 year a large number of carcasses selected for Wiltshire sides could not be used for that purpose because one routine worker continued to trim some fat from the hams as is customary for the domestic trade. Carcasses that passed his station before the error in procedure was noticed were therefore spoiled for Wiltshires. The foreign-market situation also influenced to a considerable degree the extent to which the American packers were willing to prepare Wiltshire sides for export. Thus, the experimental procedure followed after the hogs reached the market was to a considerable extent outside the control of the Department.

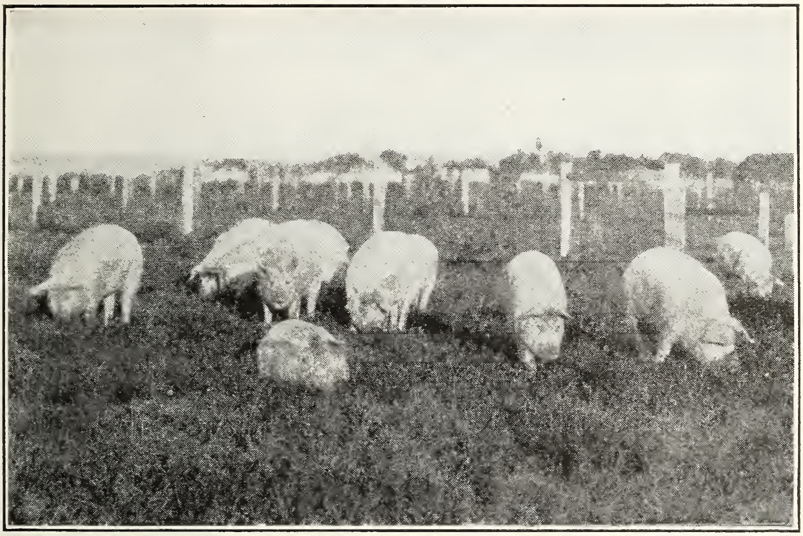

FIGURE 6.—Yorkshire-Chester White crossbred pigs on pasture at the United States Range Livestock Experiment Station. These crossbreds are representative of those produced during the experiment.

FIRST EXPERIMENT, 1927

In 1927 the purebred Yorkshire hogs made much slower gains than any of the other groups, with the result that the average final weight of the Yorkshires was 23 pounds less than that of the Chester White × Yorkshire hogs, the next lightest group. Although differences in economy of gain were slight, table 1 shows that both groups of crossbreds were somewhat more efficient in the utilization of feeds than either group of purebreds.

Table 1.—*Gains and feed consumption of hogs used in the 1927 trial, from June 23 to October 6 (105 days)*

Breeding	Hogs	Average weight		Average gain		Feeds consumed per 100 pounds of gain				Average shrinkage en route
		Initial	Final	Total	Daily	Barley	Tankage	Minerals	Total	
	Number	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Percent*
Yorkshire	49	35.3	155.9	120.6	1.15	355.9	13.7	0.8	370.4	2.1
Chester White	20	40.8	179.7	138.9	1.32	361.4	18.7	1.4	381.4	2.6
Yorkshire × Chester White[1]	49	43.3	192.6	149.3	1.42	341.5	13.3	.9	355.8	3.8
Chester White × Yorkshire	50	41.6	179.0	137.4	1.31	349.8	13.1	.7	363.6	1.9

[1] Throughout the text and tables the breed first named is the sire.

Grading of the live hogs was conducted by a committee consisting of three animal husbandmen, one each from the Bureau of Animal Industry, the North Dakota Agricultural Experiment Station, and the Minnesota Agricultural Experiment Station. This committee accepted as suitable for Wiltshire sides about 20 percent of the hogs weighing less than 181 pounds, 75 percent of those weighing between 181 and 219 pounds, and 60 percent of those weighing more than 219 pounds (table 2). A higher percentage of Yorkshire × Chester White hogs were judged to be suitable for Wiltshire sides than of any of the other groups.

Table 2.—*Percentage of live hogs and of carcasses suitable for Wiltshire sides, 1927 experiment*

Breeding	Hogs weighing less than 181 pounds		Hogs weighing 181 to 219 pounds		Hogs weighing more than 219 pounds		Hogs marketed	
	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires
LIVE HOGS								
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Yorkshire	36	11.1	12	66.7	1	100.0	49	26.5
Chester White	11	0	9	44.4	0	0	20	20.0
Yorkshire × Chester White	16	31.3	27	85.2	6	50.0	49	63.3
Chester White × Yorkshire	28	28.6	19	89.5	3	66.7	50	54.0
HOG CARCASSES								
Yorkshire	36	5.6	12	83.3	1	100.0	49	26.5
Chester White	11	0	9	66.7	0	0	20	30.0
Yorkshire × Chester White	16	12.5	27	92.6	6	66.7	49	63.3
Chester White × Yorkshire	28	21.4	19	42.1	3	66.7	50	32.0

The record of the carcass grading, as performed by the packing-company representative, is also summarized in table 2, which shows in most cases a fairly close agreement between the carcass grading and the grading of the live hogs. The packing-company representative accepted about 10 percent of the carcasses from hogs weighing less than 181 pounds, more than 70 percent of those from hogs weighing between 181 and 219 pounds, and 70 percent of the carcasses from hogs weighing more than 219 pounds. He also showed a preference for the Yorkshire × Chester White hogs. Despite the fact that the packing-company representative accepted 66 carcasses as suitable for conversion into Wiltshire sides, the packing company selected only 5 of the carcasses to be exported. These were from lightweight hogs as information then available indicated that hogs of 180 pounds' live weight were the most desirable for conversion into Wiltshire sides. An additional carcass selected was that of a Duroc-Jersey hog from another experimental group. However, since this animal had been fed the same rations as those in the Wiltshire experiment, the observations obtained on this carcass are included in the data. The Wiltshire sides exported in 1927 weighed about 50 pounds each when cut and trimmed and were from hogs averaging 177 pounds' live weight. Incidentally, the packing company converted 47 of the 66 carcasses into Cumberland sides, which were exported to the Liverpool market. A Cumberland is another pork cut peculiar to the English market, and may be described as a Wiltshire side with the ham removed.

Measurements of the six carcasses exported as Wiltshire sides are recorded in table 3. The measurement for length was from the first rib to the lower point of the split aitchbone as the carcasses hung on the rail. The measurement for depth was taken at the fifth rib. The thickness of back fat is an average of four measurements taken along the back, whereas the thickness of shoulder fat was obtained at the thickest point. There was little variation in the measurements of the carcasses used for conversion into Wiltshire sides, the range of difference in length being only 1½ inches.

Table 3.—*Carcass data and English comments on Wiltshire sides exported in 1927*

Hog No.	Breeding	Live weight	Warm dressed weight [1]	Length of carcass	Depth of carcass	Thickness of back fat	Thickness of shoulder fat	Weight of sides	English comment
		Pounds	*Pounds*	*Inches*	*Inches*	*Inches*	*Inches*	*Pounds*	
26	Chester White ×Yorkshire.	179	135	29.0	13.5	1.1	1.8	50.5 52.3	Short side, heavy hock. Thin side, heavy hock.
38	do	171	131	28.5	13.3	1.5	2.0	49.5 50.0	Nice, shapely side. Shapely side.
190	do	178	132	29.3	14.0	1.0	1.5	50.0 49.5	Wide, flat side. Wide side, heavy hock.
192	do	181	138	30.0	13.0	1.0	1.5	50.5 52.0	Nice side, heavy shoulder. Do.
199	do	170	131	30.0	13.0	.8	.8	49.0 50.0	Well-shaped side. Shapely side.
303	Duroc-Jersey	185	135	29.3	13.0	1.1	1.8	49.8 50.8	Wide, short side. Do.

[1] In all experiments, except that of 1930, weights of carcass were obtained with only viscera removed.

In addition to the English comment on each Wiltshire side exported as given in table 3, the following English comment was received for the entire shipment:

> The impression conveyed is of 12 light, short, fairly thin sides of the big-shouldered wide-necked hog, causing the gammon end to appear light in comparison. The ribs and loin also appeared light in comparison with those of the Continental and Canadian meats.

From the comments on this group of Wiltshire sides by the English distributor it appears that longer and heavier sides would have been more acceptable. As shown in table 3, the sides from hogs 38 and

199 received the most favorable comment. Incidentally, these two hogs had the thinnest and thickest back fat, respectively.

SECOND EXPERIMENT, 1928

As shown by the data in table 4, which are in general in agreement with the 1927 results, the crossbred pigs in the 1928 experiment made slightly more rapid and more economical gains than the purebred pigs. The Chester White × Yorkshire hogs required approximately 25 pounds less feed per 100 pounds of gain in weight than the other groups. The differences in economy of gains among the other groups were slight. In general, the rate of gain was somewhat slower and the feed requirements per unit of gain somewhat higher in 1928 than in 1927.

TABLE 4.—*Gains and feed consumption of hogs used in the 1928 trial, from June 13 to October 3 (112 days)*

Breeding	Hogs	Average weight		Average gain		Feeds consumed per 100 pounds of gain				Average shrinkage en route
		Initial	Final	Total	Daily	Barley	Tankage	Minerals	Total	
	Number	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Percent*
Yorkshire	50	43.8	184.2	140.4	1.25	388.1	13.5	0.9	402.4	8.2
Chester White	40	39.4	176.7	137.3	1.23	384.2	19.0	1.4	404.5	5.6
Yorkshire × Chester White	40	44.4	188.1	143.7	1.28	379.0	20.4	1.5	400.8	8.0
Chester White × Yorkshire	38	37.4	185.0	147.6	1.32	360.3	14.9	1.1	376.3	7.5

Table 5 shows the grading data obtained on the live hogs by a committee of three animal husbandmen, one each from the United States Range Livestock Experiment Station and the North Dakota Agricultural Experiment Station and one employed by the packing company.

TABLE 5.—*Percentage of hogs, in the 1928 experiment, having the designated market grade, body conformation, quality, and finish*

Breeding	Hogs	Market grade					
		Prime	Choice	Good	Medium	Common	Cull
	Number	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Yorkshire	50	6.0	14.0	40.0	16.0	22.0	2.0
Chester White	40	0	27.5	40.0	22.5	10.0	0
Yorkshire × Chester White	40	0	35.0	45.0	17.5	2.5	0
Chester White × Yorkshire	38	0	21.1	34.2	31.6	10.5	2.6

Breeding	Hogs	Body conformation								
		Length			Depth			Width		
		Long	Medium	Short	Deep	Medium	Shallow	Wide	Medium	Narrow
	Number	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Yorkshire	50	52.0	42.0	6.0	26.0	60.0	14.0	14.0	64.0	22.0
Chester White	40	20.0	72.5	7.5	17.5	72.5	10.0	7.5	87.5	5.0
Yorkshire × Chester White	40	67.5	37.5	0	7.5	87.5	5.0	2.5	90.0	7.5
Chester White × Yorkshire	38	42.1	52.6	5.3	23.7	63.2	13.2	2.6	86.8	10.5

TABLE 5.—*Percentage of hogs, in the 1928 experiment, having the designated market grade, body conformation, quality, and finish*—Continued

Breeding	Hogs	Quality			Finish		
		Fine	Medium	Coarse	Fat	Medium	Thin
	Number	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Yorkshire	50	36.0	62.0	2.0	18.0	64.0	18.0
Chester White	40	20.0	80.0	0	7.5	85.0	7.5
Yorkshire × Chester White	40	30.0	70.0	0	5.0	82.5	12.5
Chester White × Yorkshire	38	2.6	76.3	21.1	5.3	86.8	7.9

There were only 3 Prime animals and these were all purebred Yorkshires. Of the 20 Common hogs, 11 were Yorkshires also, as was 1 of the 2 Cull grade animals. The purebred Yorkshires, therefore, showed much more variation in market grade than any of the other groups. A higher percentage of the offspring of Chester White dams, whether purebred or Yorkshire × Chester White pigs, were graded Choice and Good than of the Yorkshire dams. The Yorkshire × Chester White hogs were graded higher as slaughter hogs than were any of the other groups, 80 percent of them being graded as Choice or Good.

There was a higher percentage of long hogs in the Yorkshire × Chester White group than in any of the others. The purebred Yorkshires ranked second in this respect, whereas the Chester Whites were judged to be the shortest bodied. In depth of body, the lack of uniformity in the purebred Yorkshires was again apparent, as there was a higher percentage of both deep and shallow hogs in this group than in any of the others. There was also a higher percentage of both deep and shallow hogs in the crossbreds from Yorkshire dams than in the purebreds or crossbreds from Chester White dams. The Yorkshire × Chester White hogs were the most uniform in this respect, 87.5 percent being scored as medium.

In width of body, quality, and degree of finish, a lower percentage of the purebred Yorkshires were judged as medium than of any of the other groups, again indicating the least uniformity among the Yorkshires. A higher percentage of the Chester White × Yorkshire hogs were graded as coarse in quality than of any of the other groups. In a breeding program designed to produce a distinct type of animal, uniformity of the offspring is of prime importance. The results of the grading in 1928 indicate that the offspring of Chester White dams, both purebred and crossbred pigs, were more uniform than the pigs farrowed by Yorkshire dams.

The same committee that classified the live hogs as to market grade also classified the individual animals as to their suitability for conversion into Wiltshire sides. This committee accepted all the Yorkshire × Chester White hogs, as shown in table 6. The purebred Yorkshires were graded the lowest, only 58 percent being considered suitable. This low percentage was largely due to the fact that this group had the highest percentage of unfinished hogs. In the four groups only one hog, a Chester White, weighing between 181 and 219 pounds, was considered unsuitable for Wiltshire sides.

TABLE 6.—*Percentage of live hogs and carcasses suitable for Wiltshire sides (1928 experiment)*

LIVE HOGS

Breeding	Hogs weighing less than 181 pounds		Hogs weighing 181 to 219 pounds		Hogs weighing more than 219 pounds		Hogs marketed	
	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Yorkshire	23	8.7	21	100.0	6	100.0	50	58.0
Chester White	27	48.1	11	90.9	2	50.0	40	60.0
Yorkshire × Chester White	11	100.0	28	100.0	1	100.0	40	100.0
Chester White × Yorkshire	18	44.4	16	100.0	4	75.0	38	71.1
HOG CARCASSES								
Yorkshire	23	17.4	21	81.0	6	100.0	50	54.0
Chester White	27	11.1	11	90.9	2	100.0	40	37.5
Yorkshire × Chester White	11	63.6	28	85.7	1	100.0	40	80.0
Chester White × Yorkshire	18	33.3	16	81.3	4	100.0	38	60.5

The meat specialist of the packing company who graded the carcasses found somewhat fewer of these suitable for Wiltshire sides than did the committee grading the live hogs. However, of 76 carcasses from hogs weighing between 181 and 219 pounds, 64 were accepted as suitable, as were all the carcasses from hogs weighing more than 219 pounds. The packer's representative also agreed that the Yorkshire × Chester White carcasses had the largest percentage of suitable Wiltshire sides.

The procedure followed in 1928 in obtaining slaughter and meat-cutting data differed materially from that of the preceding year. The animal husbandman employed by the packing company carefully selected, from each of the four groups of experimental animals, five representative hogs, which were processed in the usual manner for domestic consumption, and five similar hogs from each group, which were converted into Wiltshire sides and exported to the English market. This procedure made available the most carefully controlled slaughter and meat-cutting tests obtained during the years that these experiments were conducted and gave detailed data as to the suitability of hogs of Wiltshire type for the domestic pork trade.

There was some variation in the average live weight of the hogs that were selected to be cut domestic style as it was deemed more important to choose, as far as possible, animals with a similar degree of finish. The Chester Whites, as shown in table 7, yielded a slightly higher dressing percentage than the other groups, which was apparently due to a greater quantity of fat in the carcass. The Yorkshires had the lowest dressing percentage, which was associated with the least fat, as shown by the cutting yields. The hams from the Yorkshires were heavier than might have been expected from the appearance of the hogs. These hams, although not so round or plump as those of the Chester Whites, were wider and yielded a slightly higher percentage of the total carcass weight. The Yorkshires also had a slightly higher percentage of bony cuts. Of the 10 sides of bacon in each group, the Yorkshires yielded 6 sides of first-quality bacon, the Chester Whites 7 sides, the

Yorkshire × Chester White hogs, 9 sides, and the Chester White × Yorkshire hogs, 10 sides. The packing-company officials stated that this yield of first-quality bacon was highly satisfactory and that the type of hogs was well suited for their domestic trade.

TABLE 7.—*Average meat-cutting data for hogs cut domestic style in the 1928 experiment*

[5 hogs in each group]

Breeding	Live weight of hog	Weight of cold carcass	Dressing percentage	Percentage of cold-carcass weights comprised by—					
				Principal cuts					
				Hams	Loins	Bacon	Picnic shoulder	Boston butts	Total
	Pounds	*Pounds*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Yorkshire	220.6	161.7	73.3	19.2	14.6	14.1	7.7	7.2	62.7
Chester White	201.8	151.5	75.1	19.0	13.9	14.1	8.1	7.3	62.4
Yorkshire × Chester White	196.4	145.6	74.1	19.5	14.3	13.9	8.2	6.7	62.7
Chester White × Yorkshire	216.2	161.3	74.6	19.4	14.8	13.7	7.6	7.1	62.6

Breeding	Percentage of cold-carcass weights comprised by—								
	Fat trimmings						Bony cuts		
	Leaf	Back	Clear plate	Ham	Jowl	Total	Feet	Spare ribs	Neck bones
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Yorkshire	1.5	8.2	3.6	3.4	1.1	17.7	2.7	3.0	1.2
Chester White	2.0	9.1	3.2	3.8	1.1	19.2	2.5	2.5	1.0
Yorkshire × Chester White	1.9	9.6	3.0	3.4	1.1	19.0	2.3	2.7	1.2
Chester White × Yorkshire	2.1	8.7	2.9	4.3	1.0	19.0	2.5	2.8	1.1

Breeding	Percentage of cold-carcass weights comprised by—				Measurements of carcass			
	Bony cuts			Regular trim and jowl butts	Length	Depth	Width at hams	Thickness of back fat
	Tail	Head	Total					
	Percent	*Percent*	*Percent*	*Percent*	*Inches*	*Inches*	*Inches*	*Inches*
Yorkshire	0.3	6.3	13.5	6.0	31.9	14.8	10.9	1.4
Chester White	.2	6.2	12.5	6.0	29.7	14.5	10.7	1.5
Yorkshire × Chester White	.2	5.8	12.2	6.1	30.1	14.4	10.7	1.5
Chester White × Yorkshire	.3	5.6	12.2	6.2	31.5	14.9	10.7	1.2

The carcasses of the hogs selected for cutting into Wiltshire sides were a little longer and a little wider through the hams than those cut domestic style. The Wiltshire sides from the Chester White hogs, as shown in table 8, yielded a somewhat lower percentage of the cold-carcass weight than did the other groups. This was due to the removal of a higher percentage of fat trimmings. The carcasses converted into Wiltshire sides yielded about 78 percent of the cold-carcass weight in Wiltshires, whereas the carcasses cut domestic style yielded about 62 percent in hams, loins, bacon, picnic shoulders, and Boston butts. The English processor or packing company, therefore, apparently eliminates many marketing problems by disposing of a much larger edible portion of the carcass as one product, and the disposal of the less desirable cuts is largely passed on to the retailer.

TABLE 8.—*Average meat-cutting data for hogs cut into Wiltshire sides in the 1928 experiment*

[5 hogs in each group]

Breeding	Live weight of hog	Weight of cold carcass	Dressing percentage	Percentage of cold-carcass weights comprised by—				
				Wiltshire sides	Head	Leaf fat	Tenderloin	Regular trim
	Pounds	*Pounds*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Yorkshire	221.8	162.8	73.4	79.0	6.1	1.5	0.7	1.7
Chester White	201.2	149.8	74.4	77.8	6.4	1.9	.7	1.9
Yorkshire × Chester White	201.2	149.8	74.5	78.9	5.7	1.8	.8	2.0
Chester White × Yorkshire	216.2	160.9	74.4	78.7	5.8	1.8	.8	2.2

Breeding	Percentage of cold-carcass weights comprised by—					Measurements of carcass			
	Fat trim	Jowl fat	Feet	Bones	Tail	Length	Depth	Width at hams	Thickness of back fat
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Inches*	*Inches*	*Inches*	*Inches*
Yorkshire	1.2	2.4	2.7	4.6	0.3	32.4	14.3	11.6	1.5
Chester White	1.6	2.6	2.7	4.2	.2	29.8	14.4	11.1	1.4
Yorkshire × Chester White	1.3	2.5	2.5	4.1	.2	30.5	15.4	10.9	1.4
Chester White × Yorkshire	1.2	2.2	2.5	4.6	.3	32.4	14.9	10.8	1.2

The London representative of the packing company visited its plant on October 29, 1928. At that time he inspected the four groups of Wiltshire sides then in cure and his comments were as follows:

> Yorkshires.—Had enough length and depth and very good in shoulders. Some might have criticized them for being a little thin in the rear flank.
>
> Chester Whites.—Not quite long enough or as uniform as Yorkshires. Light in shoulders.
>
> Yorkshire × Chester White.—Little heavy in shoulders; otherwise very good Wiltshires.
>
> Chester White × Yorkshire.—Too much variation in type. One very thick heavy sort; one too thick. As a lot they were too short and heavy in the shoulders.

The sales value per hundredweight given to the various groups in London were as follows: Chester Whites, 96 shillings ($23.28); Yorkshires, 90 shillings ($21.82); Yorkshire × Chester White, 90 shillings ($21.82); Chester White × Yorkshire, 84 shillings ($20.37).

THIRD EXPERIMENT, 1929

In the 1929 experiment the purebred Yorkshire pigs were much slower in rate of gain than were the other three groups. The purebred Chester Whites required considerably more feed per unit of gain than any of the others. The growth of several of the Chester Whites was retarded by severe cases of sunscald; nevertheless, the group made as rapid gains as any of the others. When the feeding trial was closed on October 15, the Chester Whites averaged nearly 30 pounds more in weight than the Yorkshires. The gains and feed consumption of the hogs used in the 1929 experiment are shown in table 9.

Table 9.—*Gains and feed consumption of hogs used in the 1929 trial, from June 12 to October 15 (125 days)*

Breeding	Hogs	Average weights		Average gains		Feeds consumed per 100 pounds of gain				Average shrinkage en route
		Initial	Final	Total	Daily	Barley	Tankage	Minerals	Total	
	Number	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Percent*
Yorkshire	30	44.3	183.9	139.6	1.12	390.0	12.8	1.5	404.2	6.5
Chester White	22	49.3	213.5	164.2	1.31	440.7	17.6	2.1	460.4	6.3
Yorkshire × Chester White	42	35.8	199.0	163.2	1.31	356.6	10.9	1.0	368.5	6.3
Chester White × Yorkshire	47	41.3	203.6	162.3	1.30	365.6	10.8	0.9	377.3	3.0

Table 10 shows the grading data obtained on the live hogs by a committee of three, two representing the Range Experiment Station and one the Montana station. The purebred Chester Whites received the highest market grades, and the two crossbred groups were graded between the Chester Whites and Yorkshires. There were higher percentages of long hogs, shallow hogs, thin hogs, and narrow hogs in the Yorkshire group than in any of the others. The Chester Whites were wider than the Yorkshires, but there were slightly more wide hogs among the Chester White × Yorkshire group than among the Chester Whites. More of the crossbreds were graded as coarse in quality than of the purebreds. The Yorkshires excelled in the percentage of fine-quality hogs.

Table 10.—*Percentage of hogs, in the 1929 experiment, having the designated market grades, body conformation, quality, and finish*

Breeding	Hogs	Market grade					
		Prime	Choice	Good	Medium	Common	Cull
	Number	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Yorkshire	30	0.0	23.3	43.3	33.3	0	0
Chester White	20	5.0	75.0	15.0	5.0	0	0
Yorkshire × Chester White	42	0	47.6	42.9	9.5	0	0
Chester White × Yorkshire	47	0	42.6	55.3	2.1	0	0

Breeding	Hogs	Body conformation								
		Length			Depth			Width		
		Long	Medium	Short	Deep	Medium	Shallow	Wide	Medium	Narrow
	Number	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Yorkshire	30	73.3	26.7	0	16.7	73.3	10.0	6.7	60.0	33.3
Chester White	20	35.0	65.0	0	45.0	55.0	0	25.0	75.0	0
Yorkshire × Chester White	42	42.9	57.1	0	21.4	76.2	2.4	7.1	81.0	11.9
Chester White × Yorkshire	47	36.2	59.6	4.3	34.0	63.8	2.1	27.7	70.2	2.1

TABLE 10.—*Percentage of hogs, in the 1929 experiment, having the designated market grades, body conformation, quality, and finish*—Continued

Breeding	Hogs	Quality			Finish		
		Fine	Medium	Coarse	Fat	Medium	Thin
	Number	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Yorkshire	30	40.0	60.0	0.0	13.3	70.0	16.7
Chester White	20	0	95.0	5.0	35.0	65.0	0
Yorkshire × Chester White	42	16.7	69.0	14.3	21.4	76.2	2.4
Chester White × Yorkshire	47	2.1	83.0	14.9	38.3	59.6	2.1

Table 11 shows the percentages of live hogs of different weights judged by the committee to be suitable for Wiltshire sides. This table also shows the percentages of carcasses accepted by a representative of the packing company as suitable for Wiltshire sides. In this test the packer's representative accepted only two carcasses in the four groups from hogs of less than 181 pounds live weight and accepted for Wiltshires the carcasses of some hogs weighing more than 260 pounds. However, he was careful to select from the heavier hogs only animals with considerable length and quality, and those that were not too fat. The experimental hogs in 1927, 1928, and 1929 were shipped to a different market each year and, therefore, were slaughtered by different packing companies. The representative of the packing company slaughtering the hogs in 1929 had in mind decidedly different standards for weight than those selecting carcasses for Wiltshires in the previous years. Some of the Wiltshire sides exported in 1929 had 50 percent greater weight than those exported in 1927.

TABLE 11.—*Percentage of live hogs and carcasses suitable for Wiltshire sides (1929 experiment)*

LIVE HOGS

Breeding	Hogs weighing less than 181 pounds		Hogs weighing 181 to 219 pounds		Hogs weighing more than 219 pounds		Hogs marketed	
	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Yorkshire	13	23.1	15	100.0	2	50.0	30	63.3
Chester White	2	50.0	8	62.5	10	30.0	20	45.0
Yorkshire × Chester White	11	45.5	23	87.0	8	75.0	42	73.8
Chester White × Yorkshire	13	30.8	17	88.2	16	37.5	46	54.3
HOG CARCASSES								
Yorkshire	13	0	15	60.0	2	100.0	30	36.7
Chester White	2	0	8	75.0	10	90.0	20	75.0
Yorkshire × Chester White	11	9.1	23	87.0	8	87.5	42	66.7
Chester White × Yorkshire	13	7.7	17	76.5	16	75.0	46	56.5

It is this difference in the weight standards for Wiltshire sides of the several packing companies that is largely responsible for the differences in the live-hog and carcass grades for Wiltshires in 1929. Of the 63 hogs in the four experimental groups weighing between 181 and 219 pounds, the grades of the live hogs and carcasses as to suitability for Wiltshire sides were in agreement in all except nine cases. Within the intermediate weight groups, there was no decided preference for hogs of any particular breeding.

From the hogs marketed in 1929 the packing company prepared 65 Wiltshire sides and exported them to the Liverpool, England, market. The comments of the English distributors handling this shipment were so favorable that it was difficult to obtain information showing a significant preference for the Wiltshire sides from any one of the experimental groups. The general comments of the English distributors on this shipment were as follows:

> All of this bacon is superior to any previous arrival of American Wiltshires that we have had at this port, the type of hog being very much superior. By this we mean long sides, leaner, and quite equal to the best brands of Canadian bacon. The bacon is very much firmer. We do not know whether to attribute this to the superior hog or to a different cure.

This statement throws some light on the difficulties that American packers have encountered in obtaining suitable hogs for conversion into Wiltshire sides. The long, smooth, well-muscled, but also well-finished type of hog necessary for the production of first-class Wiltshire sides cannot be obtained in any appreciable number unless producers make an effort to market animals of this type.

Before shipment the packing company sorted the Wiltshire sides into groups according to the weight of the sides and thickness of back fat. The heaviest sides exported were from two Chester White × Yorkshire hogs. One of these hogs weighed 260 pounds and the other 257 pounds. Both had been judged as too heavy for Wiltshires by the grading committee at Miles City. The four Wiltshire sides from these hogs averaged 71.5 pounds each and sold at 95 shillings ($23.17) per hundredweight on the English market. The comments on the four sides by the English distributor were as follows:

> Nice bright appearance; cut, trim, and quality O. K. Firm, perfect condition in every respect. Much improved type of hog.

Thus, in 1929, Wiltshire sides weighing nearly 50 percent more than what was considered the ideal weight in 1927 were marketed without producing any unfavorable comment as to their being too heavy.

Table 12 shows that the sides graded by the packers as having a back-fat thickness of 1.5 inches sold at lower prices than sides having a back-fat thickness of 1 inch.

The English distributor also measured the length of each side. His measurements were taken from the first rib to the knuckle bone. The carcass measurements for length taken at time of slaughter were from the lower edge of the first rib to the lowest point of the split aitchbone as the carcass hung on the rail. The English measurements are about 2 inches shorter than the American measurements for length taken on the same hogs. It seems probable that a Wiltshire side would shrink in length during the curing process and shipment, as with the backbone removed there would be no skeletal structure to prevent the side from shrinking. Regardless of the cause for the differences in length, it is important that allowances be made for them.

TABLE 12.—*Data on shipment of 65 Wiltshire sides exported to the English market in 1929*

Selling price per hundredweight for Wiltshire sides of various weights	Hogs producing Wiltshire sides					Average weight	
	Yorkshires	Chester Whites	Yorkshire × Chester White	Chester White × Yorkshire	Total	Live	Cold dressed
	Number	*Number*	*Number*	*Number*	*Number*	*Pounds*	*Pounds*
100 shillings ($24.39)	4	1	4	6	15	214. 3	141. 3
95 shillings ($23.17):							
50–55 pounds	0	0	2	8	10	197. 3	126. 6
70–75 pounds	0	0	0	4	4	258. 5	170. 0
94 shillings ($22.92):							
55–60 pounds	2	3	2	5	12	208. 1	137. 9
60–65 pounds	1	5	3	7	16	224. 5	149. 6
65–70 pounds	0	0	3	5	8	238. 9	160. 6

Selling price per hundredweight for Wiltshire sides of various weights	Carcass measurements at time of slaughter						
	Length	Depth	Thickness at—		Average thickness of back fat	Packers' back-fat classification [1]	Length of Wiltshire side measured by English distributor
			Shoulders	Hams			
	Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
100 shillings ($24.39)	30. 6	12. 8	10. 8	11. 2	1. 3	1. 0	28. 3
95 shillings ($23.17):							
50–55 pounds	29. 9	12. 2	10. 4	11. 1	1. 2	1. 0	27. 3
70–75 pounds	32. 7	13. 1	10. 9	11. 9	1. 4	1. 0	30. 8
94 shillings ($22.92):							
55–60 pounds	29. 8	12. 7	10. 9	11. 1	1. 5	1. 5	28. 3
60–65 pounds	30. 5	12. 9	11. 3	11. 3	1. 5	1. 5	28. 1
65–70 pounds	31. 0	13. 1	11. 6	11. 5	1. 7	1. 5	28. 8

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[1] Not a measurement, but was made by the use of a small board with a 1-inch offset on 1 end and a 1½-inch offset on the other.

FOURTH EXPERIMENT, 1930

In addition to the 4 experimental groups fed ground barley and tankage on irrigated alfalfa pasture as in previous years, 15 pigs were fattened on corn and tankage on alfalfa pasture. Of the pigs receiving corn and tankage there were 3 in each of the following groups: Yorkshires, Chester Whites, Yorkshire × Chester White, Chester White × Yorkshire, and Duroc-Jerseys. These pigs were added to the experiment to determine whether differences in the feeds used would result in any considerable differences in the reception of the Wiltshire sides on the English market. Because the feeding trial with these pigs is not strictly comparable with those fed barley and tankage, since they differ in both breeding and in rations fed, results in the feed lot are not reported.

As shown in table 13, the crossbred pigs fattened on barley made more rapid gains than either of the purebred groups. The Chester White × Yorkshire pigs made the most economical gains of the four groups, and the purebred Chester White group required the greatest quantity of feed per unit of gain.

TABLE 13.—*Gains and feed consumption of hogs used in 1930 trial, from June 18 to October 23 (127 days)*[1]

Breeding	Hogs	Average weight		Average gain		Feeds consumed per 100 pounds of gain				Average shrinkage en route
		Initial	Final	Total	Daily	Barley	Tankage	Minerals	Total	
	Number	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Percent*
Yorkshire	22	42.4	193.7	151.3	1.26	403.3	16.9	1.7	421.8	3.6
Chester White	20	42.2	191.7	149.6	1.25	411.8	26.1	1.4	439.3	6.1
Yorkshire × Chester White	21	50.0	200.7	150.7	1.32	408.5	20.2	1.1	429.8	6.0
Chester White × Yorkshire	37	52.5	204.3	151.8	1.39	385.1	12.0	1.1	398.2	3.4

[1] The heavier hogs in each group were removed on September 30 and shipped to market.

In order that a larger percentage of the hogs in this experiment might be marketed at a desirable weight for conversion into Wiltshire sides, two shipments to market were made in the fall of 1930. One shipment was made on October 2 and the other on October 24. The more rapid gains made by the crossbred hogs are indicated by the larger number from these groups ready for market at time of first shipment (table 16).

As in preceding years, the hogs were individually graded by a committee of three at the Range Experiment Station. The committee graded each animal as a market slaughter hog and also scored the individual hogs for length, depth, width, quality, and finish. The data obtained on the hogs in the first and second shipments are shown in table 14. In the four principal groups fattened on barley and tankage, the Yorkshire × Chester White group led in the percentage of Prime hogs. Although the other crossbred group was low in the percentage of Prime hogs, it was outstandingly higher in the percentage of Choice hogs, with the result that the combined percentage of hogs grading Choice and Prime was higher in the Chester White × Yorkshire group than in any of the others. Both purebred groups were lower than the crossbreds in the percentage of hogs grading Choice or better. The Chester Whites were somewhat shorter than the hogs of the other groups. There was a higher percentage of deep hogs and a lower percentage of wide hogs in the purebred Yorkshires than in the other groups. Only three hogs were graded as coarse, and these were all purebred Chester Whites. There seemed to be no striking differences in the finish of the four groups when graded just previous to shipment. Although there was a higher percentage of fat hogs in the crossbred groups, the percentage of thin hogs was practically the same in all four groups. However, as previously stated, a larger percentage of the crossbred hogs were ready for market at the time of first shipment.

TABLE 14.—*Percentage of hogs, in the 1930 experiment, having the designated market grade, body conformation, quality, and finish*

Fattening feeds given and breeding	Hogs	Market grade					
		Prime	Choice	Good	Medium	Common	Cull
Barley and tankage:	*Number*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Yorkshire	19	15.8	52.6	31.6	0.0	0.0	0.0
Chester White	18	16.7	55.6	27.8	0	0	0
Yorkshire × Chester White	20	25.0	55.0	20.0	0	0	0
Chester White × Yorkshire	37	13.5	70.3	16.2	0	0	0
Corn and tankage:							
Yorkshire	3	0	66.7	33.3	0	0	0
Chester White	3	0	33.3	66.7	0	0	0
Yorkshire × Chester White	3	0	33.3	66.7	0	0	0
Chester White × Yorkshire	3	0	33.3	66.7	0	0	0
Duroc-Jersey	3	0	66.7	33.3	0	0	0

Fattening feeds given and breeding	Hogs	Body conformation								
		Length			Depth			Width		
		Long	Medium	Short	Deep	Medium	Shallow	Wide	Medium	Narrow
Barley and tankage:	*Number*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Yorkshire	19	57.9	42.1	0.0	36.8	52.6	10.5	5.3	84.2	10.5
Chester White	18	38.9	61.1	0	11.1	77.8	11.1	16.7	83.3	0
Yorkshire × Chester White	20	60.0	40.0	0	30.0	65.0	5.0	20.0	70.0	10.0
Chester White × Yorkshire	37	73.0	27.0	0	29.7	67.6	2.7	18.9	73.0	8.1
Corn and tankage:										
Yorkshire	3	33.3	66.7	0	0	100.0	0	0	100.0	0
Chester White	3	0	100.0	0	0	100.0	0	0	100.0	0
Yorkshire × Chester White	3	33.3	66.7	0	0	100.0	0	0	100.0	0
Chester White × Yorkshire	3	66.7	33.3	0	0	100.0	0	33.3	66.7	0
Duroc-Jersey	3	33.3	33.3	33.3	66.7	33.3	0	66.7	33.3	0

Fattening feeds given and breeding	Hogs	Quality			Finish		
		Fine	Medium	Coarse	Fat	Medium	Thin
Barley and tankage:	*Number*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Yorkshire	19	36.8	63.2	0.0	15.8	78.9	5.3
Chester White	18	22.2	61.1	16.7	22.2	72.2	5.6
Yorkshire × Chester White	20	30.0	70.0	0	35.0	60.0	5.0
Chester White × Yorkshire	37	35.1	64.9	0	24.3	70.3	5.4
Corn and tankage:							
Yorkshire	3	0	100.0	0	0	100.0	0
Chester White	3	0	66.7	33.3	0	100.0	0
Yorkshire × Chester White	3	0	100.0	0	0	100.0	0
Chester White × Yorkshire	3	33.3	66.7	0	33.3	66.7	0
Duroc-Jersey	3	0	100.0	0	66.7	33.3	0

The data for the hogs fed corn and tankage are included also in table 14. Although the numbers of animals of the different breeding are too small for definite conclusions to be drawn, there were no Prime hogs among those fattened on corn and tankage, and only 7 out of 15 hogs were graded as Choice. The Duroc-Jersey hogs were apparently deeper bodied, wider, and had more finish than the other groups fattened on corn and tankage.

The committee grading the live hogs at Miles City classified each animal in both the first and second shipments on their desirability for Wiltshire sides. A representative of the packing company also graded the hog carcasses for their suitability for Wiltshire sides. The data on these observations are summarized in table 15. Since two shipments were made to market in 1930 a smaller number of lightweight hogs were marketed than in former years. Of 13 hogs marketed at weights of less than 181 pounds, the committee grading the live hogs accepted 5 as being suitable for Wiltshires, whereas the packer's representative classed only 2 of the carcasses as being suitable. In both cases a much higher percentage of the hogs weighing between 181 and 219 pounds were accepted as suitable for Wiltshires.

Of eight hogs from the group fattened on corn and tankage that weighed between 181 and 219 pounds, the representative of the packing company graded seven carcasses as suitable for conversion into Wiltshire sides. Although the European producers of Wiltshire sides have found it necessary to limit the quantity of corn in the ration in order to obtain carcasses of the required firmness for high-quality Wiltshire sides, the packer's representative grading these carcasses apparently found no undesirable qualities associated with the corn and tankage ration.

TABLE 15.—*Percentage of live hogs and carcasses suitable for Wiltshire sides (1930 experiment)*

LIVE HOGS

Fattening feeds given and breeding	Hogs weighing less than 181 pounds		Hogs weighing 181 to 219 pounds		Hogs weighing more than 219 pounds		Hogs marketed	
	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires
Barley and tankage:	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Yorkshire	0	0.0	19	84.2	0	0.0	19	84.2
Chester White	3	33.3	15	73.3	0	.0	18	66.7
Yorkshire × Chester White	1	100.0	15	73.3	4	75.0	20	75.0
Chester White × Yorkshire	4	25.0	25	80.0	8	87.5	37	75.7
Corn and tankage:								
Yorkshire	2	100.0	1	0	0	0	3	66.7
Chester White	3	0	0	0	0	0	3	0
Yorkshire × Chester White	0	0	3	66.7	0	0	3	66.7
Chester White × Yorkshire	0	0	3	100.0	0	0	3	100.0
Duroc-Jersey	0	0	2	50.0	1	0	3	33.3
HOG CARCASSES								
Barley and tankage:								
Yorkshire	0	0	19	79.0	0	0.0	19	79.0
Chester White	3	0	15	66.7	0	0	18	55.6
Yorkshire × Chester White	1	0	15	73.3	4	75.0	20	70.6
Chester White × Yorkshire	4	50	25	88.0	8	87.5	37	83.8
Corn and tankage:								
Yorkshire	2	0	1	0	0	0	3	0
Chester White	3	0	0	0	0	0	3	0
Yorkshire × Chester White	0	0	3	100.0	0	0	3	100.0
Chester White × Yorkshire	0	0	3	100.0	0	0	3	100.0
Duroc-Jersey	0	0	[1] 1	100.0	1	0	2	50.0

[1] Carcass of 1 hog accidentally sent to the sausage room.

Of the 53 hogs in the first shipment, 33, or 62 percent, were accepted by the packers as suitable for Wiltshires, but owing to a misunderstanding on the killing floor only 5 were converted into Wiltshire sides for export and these were all Chester White × Yorkshire. Slaughter, carcass, and meat-cutting data were obtained on the hogs in the first 1930 shipment. These data are shown in table 16. The fact that the Chester White × Yorkshire hogs had the highest dressing yield is largely due to their arrival at market in a much better condition than any of the other groups. For the first time the 4 groups were placed together at time of shipment and had access to grain in a self-feeder at one end of the car. The Chester White × Yorkshire hogs evidently fought the other hogs away from the feeder, as the shrinkage per hog in transit of this group was less than half that of any of the other groups.

TABLE 16.—*Average carcass data for hogs in the first shipment from the 1930 Wiltshire trial* [1]

Breeding	Hogs shipped	Live weight of hog	Weight of cold carcass [2]	Dressing percentage	Percentage of cold carcass weight of trimmed—					Measurements of carcass			
					Ham	Loin	Bacon	Shoulders	Total, 4 cuts	Length	Depth	Width of hams	Thickness of back fat
		Pounds	*Pounds*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Inches*	*Inches*	*Inches*	*Inches*
Yorkshire	7	201.6	132.0	65.5	14.4	10.6	9.2	12.2	46.4	30.8	12.8	10.6	1.3
Chester White	6	190.5	125.0	65.6	15.2	9.9	8.7	12.0	45.8	29.5	12.8	10.7	1.0
Yorkshire×Chester White	11	203.5	133.0	65.3	14.1	10.3	9.0	12.5	45.9	30.9	12.7	10.6	1.3
Chester White×Yorkshire	29	202.1	137.4	68.0	15.2	10.8	9.5	12.5	48.0	30.6	12.7	11.1	1.3

[1] Purebred Duroc-Jersey hog fattened on corn and tankage was also in this shipment, but since the animal was injured en route the marketing and slaughter data are not included.

[2] With head off and leaf fat and ham facings removed.

The Chester Whites yielded the lowest percentage of bacon and loins and had the thinnest back fat. The carcasses were also the shortest of any of the groups. However, the ham yield of the Chester Whites was as heavy as that of any of the groups. The Yorkshires and both crossbred groups had the same back-fat measurements.

The second shipment of hogs in the Wiltshire trial was made on October 24, but detailed meat-cutting data were not obtained on this shipment.

At the time of the second shipment of hogs from the Wiltshire trial, several other experimental groups were marketed, and some hogs from these other groups were converted into Wiltshire sides and exported to the English market. Although these hogs were not a part of the production phase of the Wiltshire experiment, their breeding and feeding were known. The breeding and rations fed for all hogs used in the preparation of Wiltshire sides for export are shown in table 17. Although detailed reports from the 1930 exportation are not available, the general comments were decidedly less favorable than for the 1929 shipment. Both shipments were prepared by the same American packing company and handled by the same Liverpool brokers. The English brokers handling the 1930 shipment reported that the American Wiltshires were too short and the shoulder and ham shanks too long, in comparison with the European Wiltshires. A comparison of tables 12 and 17 indicates that there might have been justification for the criticism that the 1930 Wiltshires were too short, as the tables show that the Wiltshires exported in 1930 were shorter than those exported in 1929. The economic situation in the English bacon trade in the fall of 1930 was also a probable factor influencing the less favorable reception of the American Wiltshire sides. The English brokers reported that Danish, Irish, and continental Wiltshires are all considered to be from hogs that were better fed and better selected, and that the sides were cured more suitably to the English taste than American and Canadian Wiltshires. The English brokers apparently did not differentiate between the Wiltshire sides prepared from hogs fattened on different rations, and the matter of firmness was not brought up in their comments on the 1930 exportation.

TABLE 17.—*Data on hogs used in preparation of Wiltshire sides exported in 1930*

Breeding	Fattening ration fed	Hogs used for Wiltshire sides	Average live weight	Average length of carcass	Wiltshires exported	Average weight of Wiltshires
		Number	*Pounds*	*Inches*	*Number*[1]	*Pounds*
Yorkshire	Barley and tankage	8	198.9	30.6	15	57.5
	Barley, corn, and tankage	1	193.0	30.4	1	54.0
Chester White	Barley and tankage	2	207.0	29.8	3	59.7
Yorkshire × Chester White	do	7	201.1	29.7	14	57.1
	Barley, corn, and tankage	1	182.0	28.9	2	52.5
	Corn and tankage	2	209.0	29.1	3	63.0
Chester White × Yorkshire	Barley and tankage	11	209.0	30.9	19	59.3
	Barley, corn, and tankage	2	187.0	28.7	3	60.0
	Corn and tankage	3	204.0	29.9	5	60.0
Duroc-Jersey	Barley and tankage	6	193.7	29.3	12	54.0
	Corn and tankage	1	201.0	29.5	2	59.0

[1] The fact that the number of Wiltshire sides exported does not correspond to the number of carcasses converted into Wiltshire sides is due to the fact that some of the sides were accidentally sent to the sausage room.

COMPARATIVE STUDIES OF AMERICAN AND EUROPEAN WILTSHIRE SIDES

Of the Wiltshire sides shipped to the Liverpool market in the fall of 1930, four were repurchased. There were also purchased four representative Wiltshire sides of Danish, Polish, Swedish, and Irish origin. These sides were shipped to the Agricultural Research Center, Beltsville, Md., where studies were made on their quality and palatability. A somewhat detailed report of this work has been published.[6]

All the sides, including those produced in the United States, arrived in this country in good condition. This fact indicated that the cure used in processing the American sides was sufficient to prevent spoilage even when the sides were reshipped.

Cooking and palatability tests were conducted on loin and ham cuts from each of the 20 sides. In tenderness and desirability of flavor of the fat and lean, the ham cuts from the American sides ranked as high as the best from the European sides. The loin cuts from the American sides were rather severely criticized. An excessive saltiness of the American loins, as compared with the others except the Polish, was in a large measure responsible for the low rating given to them in the palatability tests.

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[6] HANKINS, O. G. REPORT ON PRELIMINARY COMPARISON OF AMERICAN, DANISH, IRISH, POLISH, AND SWEDISH WILTSHIRE SIDES. Amer. Soc. Anim. Prod. Proc. 24: 291–296. 1931.

Analysis was made of the shoulder and gammon cuts from each side to determine the content of curing ingredients that they contained. The Danish sides contained decidedly less salt than the others. The American and Polish sides were rather high in salt content. In comparison with the others, the American sides, according to the shoulder analysis, were the lowest in nitrate and nitrite contents.

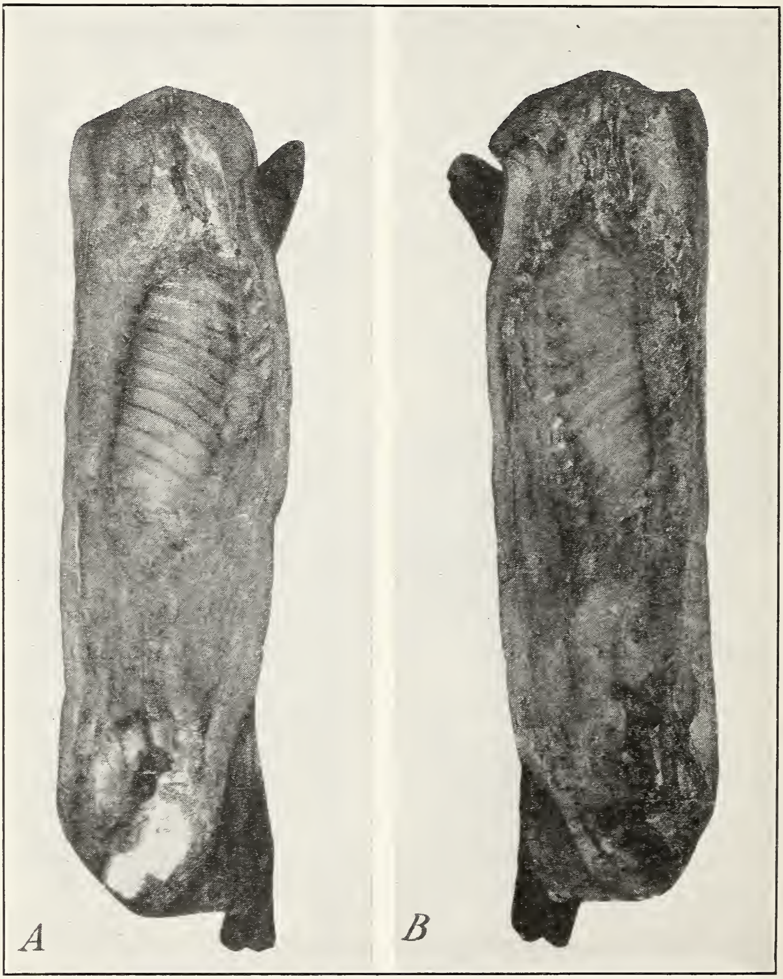

FIGURE 7.—*A*, American Wiltshire side from a hog produced in this series of experiments. This Wiltshire was exported to England, repurchased on the English market, and returned to the United States for study. *B*, Irish Wiltshire side, purchased on the English market and shipped to the United States for study in this experiment.

There was no significant difference between the average lengths of the American and Swedish sides although the former ranked third and the latter first in this respect. The American sides were wider than the others, thus tending to substantiate a criticism often made by the brokers handling the American exportations that some of these sides were too wide. There was little difference in the average thickness of the back fat of the American, Danish, Irish, and Polish sides. Those from Sweden ranked the lowest in this respect. The American sides had the greatest variation in thickness of back fat from shoulder to ham. Although the Danish sides had the thickest back fat, they

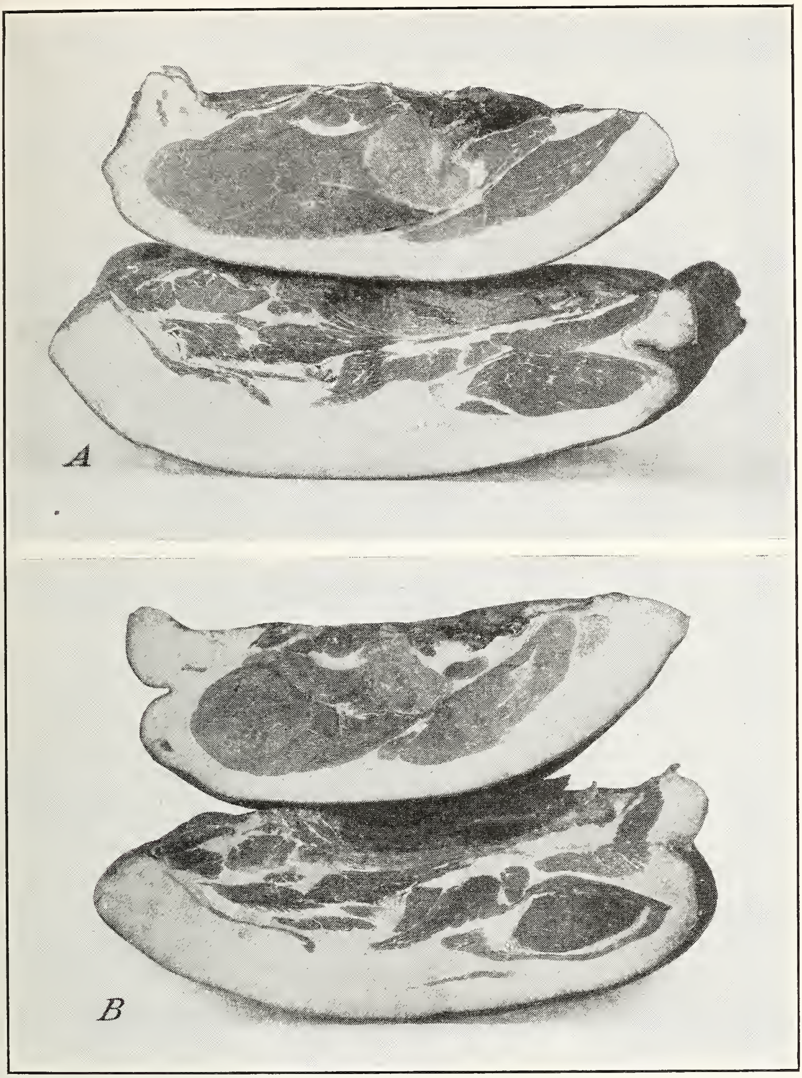

Figure 8.—*A*, Shoulder (bottom) and gammon (top) cuts from typical American Wiltshire side used in the experiment. *B*, Shoulder (bottom) and gammon (top) cuts from typical Irish side used in the experiment.

clearly showed the least variation in this respect. Figure 7 indicates the more attractive appearance of the European Wiltshires. The shape of the trimmed Irish side is more regular than that of the American and is of more uniform width. Probably the conformation of the hogs and methods of trimming the sides are both responsible for the more attractive appearance of the European Wiltshires.

Figure 8, showing similar ham cuts from American and Irish Wiltshires, seems to indicate that differences were largely external and that the American cut is at least equal in desirability to the Irish cut.

These studies showed that there is need for the development of better methods of curing and handling to produce American Wiltshire sides of a quality more acceptable to English consumers.

FIFTH EXPERIMENT, 1931

In the 1931 experiment the four groups made similar gains during the fattening trial with a slight advantage in economy of gain in favor of the purebred groups. The data for the feeding trial are shown in table 18.

Table 18.—*Gains and feed consumption of hogs used in the 1931 trial, from June 18 to October 8 (112 days)*

Breeding	Hogs	Average weight		Average gain		Feeds consumed per 100 pounds of gain				Average shrinkage en route
		Initial	Final	Total	Daily	Barley	Tankage	Minerals	Total	
	Number	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Percent*
Yorkshire	34	39. 6	178. 9	139. 3	1. 24	347. 9	7. 4	1. 0	356. 2	6. 3
Chester White	18	39. 5	184. 5	145. 0	1. 29	352. 1	12. 5	1. 8	366. 3	4. 7
Yorkshire × Chester White	30	51. 7	196. 1	144. 4	1. 29	365. 7	8. 1	1. 1	374. 9	5. 2
Chester White × Yorkshire	44	50. 5	189. 8	139. 3	1. 24	353. 9	7. 3	. 8	362. 0	3. 3

A considerable number of the hogs in the 1931 trial were retained at Miles City for use in an educational exhibit at the International Livestock Exposition. For this reason only 71 head were marketed in 1931. Although detailed meat-cutting data were not obtained on this shipment, the dressing percentages of the warm carcasses were as follows: Yorkshires, 74.4; Chester Whites, 75.4; Yorkshire × Chester White, 76.7; and Chester White × Yorkshire, 77.5.

A committee of three representatives of the station mentioned graded the hogs as to their suitability for Wiltshires, at the close of the fattening trial. The committee grading the hog carcasses in the packing plant consisted of one representative each from the Range Experiment Station, the North Dakota station, and the Bureau of Agricultural Economics of the United States Department of Agriculture.

In the grading of the live hogs and carcasses in 1931 more elaborate grading charts were used than in previous years. The grading charts used beginning in 1931 were developed jointly by the Bureaus of Animal Industry and Agricultural Economics. These charts provide for a numerical score for the individual animals on several items of conformation, as shown in table 20. The market or carcass grades are grouped into 6 major divisions ranging from Prime to Cull, corresponding to the established market grades with three subdivisions in each grade. The numerical values range from 2 for high Prime to 36 for low Cull.

Of the 71 hogs marketed in 1931, the committee grading the live hogs judged 51 to be suitable for conversion into Wiltshire sides. The committee grading the carcasses on the rail found 59 to be satisfactory. This committee rejected the carcass of only 1 purebred Yorkshire hog, the reason being lack of finish. Of the 15 carcasses from the Yorkshire group, 5 were graded on a domestic basis as Prime and 10 as Choice, thus showing that carcasses suitable for Wiltshire sides are also highly desirable for domestic use. Carcasses of 2 Chester Whites were rejected for Wiltshires, both being too thin. The 7 carcasses accepted as Wiltshires from this group were all graded as Choice from the domestic standpoint. Of the 16 carcasses accepted as Wiltshires from the Yorkshire × Chester White cross, 5 were graded as Prime and 11 as Choice. Of the 22 carcasses from the Chester White × Yorkshire cross that were found to be suitable, 7 were graded as Prime and 15 as Choice. Therefore, in all cases, carcasses suitable for conversion into Wiltshire sides were graded as either Prime or Choice from the domestic standpoint. A summary of the grading of the live hogs and hog carcasses for suitability for Wiltshires is shown in table 19.

TABLE 19.—*Percentage of live hogs and of carcasses suitable for Wiltshire sides (1931 experiment)*

LIVE HOGS

Breeding	Hogs weighing less than 181 pounds		Hogs weighing 181 to 219 pounds		Hogs weighing more than 219 pounds		Hogs marketed	
	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Yorkshire	4	25.0	11	90.9	0	0.0	15	73.3
Chester White	5	60.0	4	75.0	0	0	9	66.7
Yorkshire × Chester White	2	0	18	66.7	0	0	20	60.0
Chester White × Yorkshire	4	25.0	19	89.5	4	100.0	27	81.5

HOG CARCASSES

Breeding	Hogs weighing less than 181 pounds		Hogs weighing 181 to 219 pounds		Hogs weighing more than 219 pounds		Hogs marketed	
	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires
Yorkshire	4	75.0	11	100.0	0	0.0	15	93.3
Chester White	5	100.0	4	50.0	0	0	9	77.8
Yorkshire × Chester White	2	50.0	18	83.3	0	0	20	80.0
Chester White × Yorkshire	4	25.0	19	89.5	4	100.0	27	81.5

The summarized committee grades of the live hogs and carcasses from the 1931 experimental groups are shown in table 20. The committee graded the Chester White × Yorkshire group as more desirable for slaughter hogs than the other groups. This grading corresponds closely to the packer's appraisal, as the packing company purchased all but one hog from this group at the top price. In the other groups, however, there was not the same agreement between committee grades and the packer's appraisal. As reflected by the purchase price, the Yorkshire × Chester White were second to the Chester White × Yorkshire hogs, but the grading committee placed this group below the purebred Yorkshires. These differences in appraisal are largely accounted for in the appearance of the hogs at the market after a long, hard journey from Miles City. The Yorkshire hogs had a heavier shrinkage in transit than the other groups (table 18) and were not so desirable to the packer buyers. However, the carcasses of these animals graded as high as those from any of the other groups, as shown in table 20.

TABLE 20.—*Summarized committee grades of slaughter hogs and carcasses (1931 experiment)*

SLAUGHTER HOGS

Breeding	Hogs graded	Average numerical value of average grade [1]													Description of composite grade
		Length	Depth	Width	Back	Shoulders		Sides		Hams	Belly	Length of legs	Finish	Composite grade [2]	
						Top	Sides	Smoothness	Regularity						
Yorkshire	15	9. 2	7. 9	8. 3	9. 7	9. 9	9. 9	6. 1	7. 9	10. 0	8. 0	8. 5	7. 9	9. 1	Average Choice.
Chester White	9	6. 7	8. 4	10. 4	8. 0	7. 6	9. 1	7. 1	9. 3	9. 1	8. 2	9. 8	9. 6	9. 8	Do.
Yorkshire × Chester White.	20	9. 0	8. 0	8. 5	9. 8	9. 1	9. 8	8. 3	10. 0	10. 4	9. 1	12. 2	9. 6	9. 7	Do.
Chester White×Yorkshire.	27	7. 0	6. 7	8. 0	5. 2	5. 3	5. 7	5. 4	6. 3	7. 9	5. 5	7. 0	7. 5	6. 6	Low Prime.

HOG CARCASSES

Breeding	Carcasses graded	Average numerical value of average grade [1]												Description of composite grade
		Length	Depth	Width	Shoulder	Smoothness of sides	Fullness of flank	Plumpness of ham	Finish	Uniformity of back fat	Firmness	Smoothness of skin	Composite grade [2]	
Yorkshire	15	6. 1	6. 9	8. 3	9. 2	7. 1	8. 8	8. 1	9. 6	8. 8	5. 9	4. 5	8. 0	High Choice.
Chester White	9	7. 3	8. 2	10. 0	11. 3	11. 6	12. 7	10. 0	13. 6	9. 6	6. 0	5. 1	10. 4	Average Choice.
Yorkshire×Chester White	20	6. 8	8. 8	8. 8	8. 2	9. 1	8. 9	8. 2	9. 7	8. 9	3. 6	3. 4	8. 0	High Choice.
Chester White×Yorkshire	27	6. 4	7. 9	9. 3	8. 5	8. 6	10. 0	7. 9	10. 1	8. 3	3. 9	5. 0	8. 6	Do.

[1] 1 to 7, Prime grade; 7.1 to 13.0, Choice; 13.1 to 19.0, Good; 19.1 to 25.0, Medium; 25.1 to 31.0, Common; 31.1 to 37.0, Cull.

[2] General market desirability of the animal or carcass; not a numerical average of the other scores as greatest consideration was given to the more important items, such as hams, sides, and finish.

The committee grades of the carcasses did not entirely agree with the grades given the live hogs. In both cases the Chester Whites, on the whole, were graded as slightly less desirable than the other groups. The Chester White × Yorkshire hogs, which excelled as slaughter hogs, were graded lower in the carcass, primarily because of light flanks and lack of finish. The Yorkshire × Chester White hogs were graded decidedly higher for firmness than the other groups. The Yorkshire carcasses excelled in length and in smoothness of sides.

Although the packing company made careful selection of the carcasses suitable for conversion into Wiltshire sides, owing largely to the unfavorable condition of the livestock and meat markets both at home and abroad, no exportations were made.

SIXTH EXPERIMENT, 1932

In the 1932 Wiltshire feeding trial the purebred Yorkshire pigs made much slower gains than the other groups, with the result that at the close of the feeding trial the average weight of these was 34 pounds less than that of the next lightest group. The purebred Chester Whites and the two groups of crossbred pigs made more rapid gains in 1932 on a ration of wheat and tankage than similar groups in previous years, when barley had been the grain component of the ration.

The slower gaining group of Yorkshire pigs made slightly more economical gains than the others, although all groups were satisfactory in this respect. Compared with previous years, there was a marked reduction in the quantity of tankage consumed and an increase in the mineral requirements. The data for the 1932 feeding trials are shown in table 21.

Table 21.—*Gains and feed consumption of hogs used in the 1932 trial, from June 9 to September 29 (112 days)*

Breeding	Hogs	Average weight		Average gain		Feeds consumed per 100 pounds of gain				Average shrinkage en route
		Initial	Final	Total	Daily	Wheat	Tankage	Minerals	Total	
	Number	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Percent*
Yorkshire	50	37.9	175.4	137.5	1.23	315.3	5.5	1.8	322.6	5.9
Chester White	16	46.9	218.1	171.3	1.53	331.0	5.5	2.8	339.3	5.3
Yorkshire × Chester White	47	48.7	209.0	160.3	1.43	332.7	3.8	2.0	338.5	4.7
Chester White × Yorkshire	31	50.8	218.7	167.9	1.50	334.6	4.6	2.6	341.9	4.6

Owing to the low price for export pork in the fall of 1932, it was impossible to make arrangements with a packing company to process and export any Wiltshire sides from the hogs in this test. This situation delayed the marketing of the hogs until November 16, although the feeding trial closed on September 29. As a result of this delay in marketing, no observations as to suitability for conversion into Wiltshire sides were made, as the hogs, when marketed, were all too heavy for this purpose. At the close of the feeding trial the hogs were graded as in the previous year with the use of the standard grading charts. As shown in table 22, there was little difference in the general market desirability of the four groups, the Chester Whites and Chester White × Yorkshire hogs being classed as low Prime, and the Yorkshires and Yorkshire × Chester White hogs as high Choice. The Chester Whites and Chester White × Yorkshire group were graded as being deeper, wider, with more plumpness of ham, and carrying more finish than either of the other groups.

In each of the 13 items scored on the slaughter-hog grading chart, the Chester White × Yorkshire hogs were graded as more desirable than the purebred Yorkshires, and the purebred Chester Whites as more desirable than the Yorkshire × Chester White crossbreds. Thus, it is indicated that the introduction of Yorkshire blood was not advantageous from the standpoint of conformation of hogs for slaughter for domestic use.

The packer buyer sorted each group of hogs into two lots designated as Good to Choice and Medium. The following percentages of the several groups were graded Good to Choice: Yorkshires, 64.6 percent; Chester Whites, 100 percent; Yorkshire × Chester White, 91.5 percent; and Chester White × Yorkshire, 96.8 percent. However, the lower percentage of Choice hogs in the Yorkshire group did not greatly affect their market value, as the price received for this group was only 8 cents per 100 pounds less than the top price received. There was a range of only 1 cent per 100 pounds in the average selling price of the other three groups.

TABLE 22.—*Summarized committee grades of slaughter hogs and of carcasses (1932 experiment)*

SLAUGHTER HOGS

Breeding	Hogs graded	Average numerical value of average grade [1]													Description of composite grade
						Shoulders		Sides							
		Length	Depth	Width	Back	Top	Sides	Smoothness	Regularity	Hams	Belly	Length of legs	Finish	Composite grade [2]	
Yorkshire	48	5.0	7.1	8.0	7.0	6.6	7.1	5.8	6.7	9.5	6.8	7.3	8.0	7.4	High Choice.
Chester White	15	5.7	4.5	4.9	5.7	6.3	7.3	5.3	6.3	6.3	5.7	6.1	5.7	6.1	Low Prime.
Yorkshire × Chester White,	47	6.7	6.4	7.1	6.9	7.0	7.9	6.4	7.1	8.3	7.0	7.1	7.2	7.1	High Choice.
Chester White × Yorkshire.	31	4.6	4.9	5.4	5.1	5.3	6.5	5.0	5.9	6.5	4.9	5.8	5.8	5.8	Low Prime.

HOG CARCASSES

Breeding	Carcasses graded	Average numerical value of average grade [1]												Description of composite grade
		Length	Depth	Width	Shoulder	Smoothness of sides	Fullness of flank	Plumpness of ham	Finish	Uniformity back fat	Firmness	Smoothness of skin	Composite grade [2]	
Yorkshire	48	8.9	9.9	10.5	6.8	9.3	10.2	10.4	10.6	7.2	6.5	6.8	10.3	Average Choice.
Chester White	15	9.5	7.9	7.7	6.0	8.7	8.0	8.4	8.8	6.3	6.4	7.1	8.9	High Choice.
Yorkshire × Chester White	47	8.4	8.7	9.1	6.5	8.7	9.0	8.6	9.2	6.5	6.5	6.6	8.9	Do.
Chester White × Yorkshire	31	7.9	7.4	7.8	6.3	7.9	7.6	7.4	8.0	6.1	6.1	6.3	8.3	Do.

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[1] 1 to 7, Prime grade; 7.1 to 13, Choice; 13.1 to 19, Good; 19.1 to 25, Medium; 25.1 to 31, Common; 31.1 to 37.0, Cull.

[2] General market desirability of the animal or carcass; not a numerical average of the other scores as greatest consideration was given to the more important items, such as hams, sides, and finish.

The committee grades of the carcasses from this shipment, as presented in table 22, show about the same relative standing of the four groups as did the grades of the live hogs, although for all groups the carcass grades were somewhat lower. The committee grading the carcasses showed a slight preference for the Chester White × Yorkshire hogs, as had been the case with the committee grading the live animals.

AVERAGE RESULTS, 1927–32

All groups of sows and gilts used in this series of experiments were satisfactory breeders; 89 percent of those bred subsequently farrowed litters. However, it was found to be desirable to have the Yorkshire sows and gilts in a higher condition at farrowing time than the Chester Whites to prevent excessive emaciation during the suckling periods. The Yorkshire breeding animals gained about 10 pounds more per head during the gestation period and lost 30 to 40 pounds more during the suckling period than the Chester Whites.

Although there was little difference in the size of the litters farrowed or the average birth weights of the pigs in the several groups, there was considerable advantage, on the average, in the crossbred pigs at weaning, both in the number of pigs weaned per litter and in weaning weights. That the crossbred pigs were more vigorous at birth is demonstrated by the lower death losses during the suckling period. Yorkshire dams producing purebred pigs weaned 78 percent of the pigs farrowed alive, whereas those producing crossbred pigs weaned 84 percent. The Chester White dams producing purebred pigs weaned 72 percent of those farrowed alive, whereas those producing crossbreds weaned 78 percent. As shown in table 23, Yorkshire and Chester White sows farrowing crossbred pigs weaned 0.4 and 0.8 more pigs per litter than sows of the same breeds producing purebred pigs, and the crossbred pigs were significantly heavier at weaning than the purebreds.

There was also an increased economy in the production of weanling pigs in the crossbred groups, amounting to about 9 percent for the pigs from Yorkshire sows and 14 percent for the crossbred pigs from Chester White dams.

TABLE 23.—*Summary of production data, from beginning of breeding season until weaning of hogs used in Wiltshire experiments, 1928–32* [1]

Breeding	Sows bred	Litters farrowed	Average gain of sows from mating to weaning	Pigs weaned per litter	Average weight at 70 days	Feeds consumed per 100 pounds of pigs weaned				
						Grain	Protein supplement	Minerals	Total concentrates	Alfalfa hay
	Number	*Number*	*Pounds*	*Number*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Yorkshire	43	38	44.2	7.6	38.4	564.3	26.7	2.2	593.2	49.2
Chester White	43	36	67.0	6.6	39.4	633.0	33.0	3.5	669.5	69.3
Yorkshire × Chester White	31	29	57.4	7.4	42.7	546.1	27.8	3.9	577.7	83.5
Chester White × Yorkshire	32	29	33.2	8.0	42.8	515.3	25.6	2.0	542.9	61.5

[1] The breeding herds of sows were not maintained in experimental groups during the 1927 gestation period.

The 6-year average results of the summer-fattening trials, as summarized in table 24, show little difference in the rate or economy of gains of the two crossbred groups. Each of these groups made somewhat more rapid gains and more efficient utilization of feed than either group of purebreds. The purebred Yorkshire pigs made the slowest gains of any of the groups but had nearly the same efficiency of feed utilization as the crossbred groups. General observations on this series of experiments indicated that the crossbred pigs were decidedly more vigorous at birth, but that this increased vigor became less pronounced as the pigs became older.

TABLE 24.—*Summary of gains and feed consumption of hogs used in Wiltshire experiments, 1927–32*

Breeding	Hogs	Average weight		Average gain		Feeds consumed per 100 pounds of gain				Average shrinkage en route
		Initial	Final	Total	Daily	Grain	Tankage	Minerals	Total	
	Number	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Percent*
Yorkshire	235	40.1	176.5	136.4	1.21	362.4	11.2	1.2	374.8	5.8
Chester White	136	42.5	191.2	148.7	1.30	383.9	17.1	1.8	402.7	5.2
Yorkshire × Chester White	229	44.9	197.5	152.6	1.35	357.8	11.9	1.3	371.0	5.5
Chester White × Yorkshire	247	45.3	195.3	150.0	1.33	358.6	10.6	1.1	370.3	4.5

There was considerable variation from year to year, in the several groups, in the percentage of hogs that were graded as suitable for conversion into Wiltshire sides. However, table 25 shows that over a 5-year period the hogs produced by Chester White sows mated with Yorkshire boars ranked the highest in this respect. The other group of crossbreds ranked second. Between the two purebred groups there was little difference in the percentage of hogs suitable for Wiltshire sides. In comparison with the crossbreds, the purebred Yorkshires lacked somewhat in finish for the production of Wiltshire sides. Many of the purebred Chester Whites were too short, too wide, or too fat for the purpose. The advantages of the crossbred hogs were that they were a little longer and more heavily muscled than the purebred Chester Whites, and carried more finish than the purebred Yorkshires. The Chester White breeding animals that were most desirable were rather long-bodied and smooth, with medium length of leg, fairly plump ham, and a high degree of refinement or quality. Neither the small type nor the extremely large type hog was desired.

TABLE 25.—*Percentage of live hogs and carcasses suitable for Wiltshire sides, 1927–31*[1]

LIVE HOGS

Breeding	Hogs weighing less than 181 pounds		Hogs weighing 181 to 219 pounds		Hogs weighing more than 219 pounds		Hogs marketed	
	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Yorkshire	76	13.2	78	89.7	9	88.9	163	54.0
Chester White	48	37.5	47	70.2	12	33.3	107	51.4
Yorkshire × Chester White	41	53.7	111	84.7	19	68.4	171	75.4
Chester White × Yorkshire	67	32.8	96	88.5	35	62.9	198	65.2

HOG CARCASSES

Breeding	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires	Total	Suitable for Wiltshires
Yorkshire	76	11.8	78	79.5	9	100.0	163	49.1
Chester White	48	16.7	47	72.3	12	91.7	107	49.5
Yorkshire × Chester White	41	26.8	111	85.6	19	78.9	171	70.8
Chester White × Yorkshire	67	23.9	96	76.0	35	82.9	198	59.6

[1] In 1932 practically all the hogs, when marketed, were too heavy to be converted into Wiltshire sides.

Table 25 indicates that only a relatively small percentage of the carcasses from hogs weighing less than 181 pounds were suitable for Wiltshire sides. One of the developments of this series of experiments was that with desirable conformation and finish, hogs within a wider range of live weight than had been thought could be converted into Wiltshire sides. However, there are definite maximum limits for thickness of back fat that must be complied with if satisfactory carcasses are to be produced. Carcasses with more than 2 inches of back fat are severely criticized.

In the groups weighing more than 219 pounds, the average live weight of the hogs that were accepted was 230 pounds. The few hogs weighing as much as 250 pounds that were acceptable were long hogs with rather remarkable smoothness and quality. As a rule, hogs of desirable type for conversion into Wiltshire sides become overfat if fed to a live weight of 250 pounds. The most satisfactory degree of finish for hogs to be converted into Wiltshire sides closely approaches the maximum fatness permissible. Therefore, in the commercial production of hogs of a type suitable for conversion into Wiltshire sides, there would be a decided advantage in being located close to a market so that as the hogs reached a desired degree of finish, frequent marketings could be made.

The fact that there was considerable variation between the number of hogs graded on foot as suitable for Wiltshires and those accepted after slaughter does not necessarily indicate errors in judgment by the grading committee. The English people are careful in the selection of their meat and pay a great deal of attention to its appearance. Irregularity in the thickness of back fat, especially a thicker fat over the shoulders, often disqualifies an otherwise suitable carcass for conversion into Wiltshire sides. In these experiments a large number of hogs that were found to be suitable for Wiltshire sides except for slight bruises or scratches are recorded as being suitable. Many of the bruises affected only the skin and did not injure the quality of the meat. However, they would have appeared as dark spots on the cured sides and apparently would have been objectionable to the English consumer. Consequently, all carcasses showing skin discolorations were rejected in the selection of sides for export. Should conditions develop so that American meat packers would desire to convert any considerable portion of their hog carcasses into Wiltshire sides, it would probably be necessary to develop some system of management and marketing that would prevent the hogs from becoming scratched or bruised.

SUMMARY AND CONCLUSIONS

A series of experiments was conducted from 1927 to 1932 to determine the most satisfactory procedure for the production of hogs suitable for conversion into Wiltshire bacon for the European trade. The four principal groups of swine tested each year were one each of purebred Yorkshires and Chester Whites, and two groups representing the reciprocal crosses of these two breeds. All groups were self-fed to a marketable weight on alfalfa pasture, in most instances with barley or wheat as the grain component of the ration. So far as possible, careful slaughter and carcass studies were made from the hogs in this series of experiments, and a large number of the carcasses were converted into Wiltshire sides and exported to the English market. Some Wiltshire sides from the hogs in this series of experiments were repurchased on the English market and shipped to the United States along with representative Wiltshires produced by several European countries for detailed comparisons.

The Yorkshire and Chester White sows producing crossbred pigs weaned more pigs per litter than sows of the same breeds producing purebred pigs, and the crossbred pigs were significantly heavier at weaning than the purebreds.

In the experimental fattening trials, the crossbred pigs made somewhat faster and more economical gains than the purebred pigs.

The largest percentage of carcasses suitable for conversion into Wiltshire sides was from the groups produced by Chester White dams mated to Yorkshire boars.

Although less desirable than the crossbreds, the purebred Yorkshires and Chester Whites yielded a considerable percentage of carcasses satisfactory for Wiltshire sides, and limited observations with the Duroc-Jersey breed indicated that breeding animals of the proper type for producing Wiltshire sides could be selected from that breed. The intermediate type of hog with good length, smooth shoulders, plump hams, and with a considerable degree of smoothness and quality, if marketed at the proper weight and finish, will yield a good percentage of carcasses suitable for conversion into Wiltshire sides. This type of hog can be found in practically all the American breeds.

One of the most important conclusions from this series of experiments is that by following the methods of breeding, feeding, and management used in this investigation, it is possible to produce hogs suitable for the Wiltshire trade. In contrast to the intensive European methods of swine production, the hogs produced in this experiment were self-fed simple rations on alfalfa pasture and in rather large groups, yet a large proportion of their carcasses were found to be suitable for Wiltshire sides. Although the feeding of a limited grain ration would have prevented overfatness in a few individuals rejected as Wiltshires, these hogs were highly desirable for domestic consumption, which eliminated any economic loss.

The climate and feed conditions of the northwestern small-grain area were satisfactory for the production of hogs for the Wiltshire trade. No elaborate buildings or equipment were used, and from the time the pigs were weaned until marketed they were maintained on pasture plots with only a sunshade for shelter. The grain components of the rations (wheat and barley) are the principal grain crops of the area and no unusual feeds were used.

The type of hog which yields a high percentage of carcasses suitable for conversion into Wiltshire sides is highly desirable from the domestic standpoint.

In comparison with European Wiltshires the American sides were criticised for excessive saltiness, which suggests the necessity of improvements in the curing of American Wiltshires, if they are to be acceptable to the English consumer.

Injuries or bruises during marketing and slaughtering may eliminate carcasses that otherwise would be acceptable for Wiltshires.

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